

# **1999 SWAT MONITORING PROGRAM REPORT**

## **PART 1 MARINE AND ESTUARINE**

### **1.1 SHELLFISH TISSUE AND SEDIMENT ANALYSES**

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### **1.2 ESTUARINE SEDIMENT CHARACTERIZATION**

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### **1.3 MARINE SPORTFISH HEALTH ADVISORY**

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### **1.4 MERCURY IN HARBOR SEAL PUPS**

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1.1

## SHELLFISH TISSUE AND SEDIMENT ANALYSES

1.2

## **Shellfish Tissue Analyses**

This project addresses multiple needs identified after analysis of historical data collected by SWAT and other studies.

In 1998, interim action levels for shellfish were developed by the State Toxicologist, Bureau of Health that enable data from mussel samples to be evaluated in the context of human health. In the 1980s and early 1990s, blue mussel sample results suggest that human health advisories may be warranted in some areas of the coast due to levels of lead and mercury. Although environmental lead levels have declined nationally in various media since its removal from automotive fuels, it is reasonable to resample these areas to determine if current lead and mercury levels warrant an advisory. When these older samples were taken, organic analyses were not affordable. Many of these areas are near human population centers and/or industry and commerce. To complete the human health assessment, both organic and metal analyses should be conducted.

The Departments of Marine Resources and Environmental Protection have an active program to restore shellfish beds to harvestable conditions by removing sources of human sewage. Once sanitary pollution criteria are met, the DMR can open the area if it is assured that toxic contaminants do not pose a human health threat. In cases where the historical clam population is no longer present, direct sampling of clams makes that assurance impossible. Since a clam restoration project is an expensive commitment, there is a need to have tool available that can predict what tissue levels might likely be once clams have been restored to the area. Blue mussels are found almost everywhere along the coast, even where clams are not. Since mussels can be used to reflect local conditions, it may be possible to develop a relationship between clams, mussels, and perhaps sediment in order to predict levels expected in clams.

In the original Five Year Plan, establishment of benchmark stations to be monitored over time was identified as a high priority. Those stations have been established and sampled at least once.

Finally, areas of the coast have been identified as having elevated levels of PCBs and organo-chlorine pesticides. Mussels have been effectively used to localize sources. The Winter Harbor Landfill is known to have received PCB waste. Wildlife (eagles) in the area contain unexplained levels of PCBs.

During the 1999 sampling season the DEP and DMR sampled clams, mussels, and sediment from 11 sampling stations as indicated below..

## **Shellfish Tissue and Sediment Stations**

Back Cove, Portland

Billings Cove, Sedgewick

Cape Neddick, York

Crockett Point, Rockland Harbor

Fore River, South Portland

Goosefare Brook, Saco

Kennebunk River, Kennebunkport

Mill Cove, Boothbay Harbor

Muscongus Sound, Friendship

Perkins Cove, York

Plummer Island, Scarborough

Round Pond, Bristol

St. George River, St. George

### Acknowledgements:

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All shellfish tissue and sediment were analyzed by the Water Research Institute at the Sawyer Environmental Research Center, University of Maine, Orono, Maine

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	York/Perkins	York/Perkins	York/Perkins	York/Perkins
DEP ID#			1	2	3	4
WRI ID	DL (ug/Kg)		786P	787P	788P	789P
<b>Analytes</b>						
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	<DL	<DL	<DL	<DL
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	0.45	<DL	0.60	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	<DL	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	<DL	<DL	<DL	<DL
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	0.51	<DL	<DL	<DL
2,2',4,4',5,5' Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	0.66	0.97	1.26	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	1.24	<DL	<DL	<DL
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	<DL	0.66	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	0.98	2.04	1.05	<DL
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	<DL	1.15	<DL	<DL
Total PCBs			8.75	16.9	11.3	15.5
% Lipids			0.32	0.65	0.35	0.73
Sample weight (g)			25.49	25.25	25.69	25.64
Surrogate Recovery		% rec (65-13)	<b>88.6</b>	<b>86.9</b>	<b>107</b>	<b>81.4</b>

\* due to insufficient sample the % lipid value is an

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

**PCBs**

DEP ID#	WRI ID	<b>Analytes</b>	IUPAC#	<b>DL (ug/Kg)</b>	York/Cape	York/Cape	York/Cape	York/Cape	
					Neddick 1	790P	791P	792P	793P
2,4'-Dichlorobiphenyl			8	1.0	<DL	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl			18	1.0	<DL	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl			28	1.0	<DL	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl			29	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl			44	1.0	<DL	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl			50	1.0	<DL	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl			52	1.0	<DL	<DL	0.35	<DL	<DL
2,3',4,4'-Tetrachlorobiphenyl			66	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl			87	2.0	0.51	<DL	0.48	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl			101	2.0	<DL	<DL	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl			104	2.0	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl			128	2.0	<DL	<DL	0.55	0.66	
2,2',3,4,4',5'-Hexachlorobiphenyl			138	2.0	0.67	0.95	1.08	<DL	
2,2',4,4',5,5'-Hexachlorobiphenyl			153	2.0	<DL	<DL	<DL	<DL	
2,2',4,4',5,6'-Hexachlorobiphenyl			154	2.0	<DL	<DL	<DL	<DL	
2,2',3,4',5,5',6-Heptachlorobiphenyl			187	2.0	<DL	<DL	<DL	<DL	
2,2',3,4',5,6,6'-Heptachlorobiphenyl			188	2.0	<DL	<DL	<DL	<DL	
2,2',3,3',4,4',5,6-Octachlorobiphenyl			195	3.0	1.47	<DL	0.96	0.50	
2,2',3,3',4,5',6,6'-Octachlorobiphenyl			200	3.0	1.66	2.01	2.28	1.02	
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl			209	5.0	<DL	<DL	<DL	<DL	
Total PCBs					13.2	9.84	15.8	8.75	
% Lipids					0.34	0.33	0.34	0.28	
Sample weight (g)					26.28	26.21	25.66	24.98	
Surrogate Recovery				% rec (65-135)	<b>89.4</b>	<b>88.6</b>	<b>84.7</b>	<b>75.6</b>	

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	DL (ug/Kg)	Fore River	Fore River	Fore River	Fore River
DEP ID#	WRI ID			1 825P	2 826P	3 828P	4 829P
	<b>Analytics</b>						
2,4'-Dichlorobiphenyl		8	1.0	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl		18	1.0	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl		28	1.0	1.21	2.24	0.98	0.65
2,4,5-Trichlorobiphenyl		29	1.0	0.87	0.68	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl		44	1.0	1.02	0.79	0.55	0.41
2,2',4,6-Tetrachlorobiphenyl		50	1.0	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl		52	1.0	1.31	1.89	0.59	0.66
2,3',4,4'-Tetrachlorobiphenyl		66	1.0	<DL	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl		87	2.0	<DL	<DL	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl		101	2.0	2.06	1.15	<DL	0.75
2,2',4,6,6'-Pentachlorobiphenyl		104	2.0	0.98	0.62	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl		128	2.0	1.49	2.03	1.57	1.15
2,2',3,4,4',5'-Hexachlorobiphenyl		138	2.0	2.64	1.86	2.09	0.86
2,2',4,4',5,5'-Hexachlorobiphenyl		153	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl		154	2.0	<DL	<DL	<DL	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl		187	2.0	2.25	1.31	1.06	1.47
2,2',3,4',5,6,6'-Heptachlorobiphenyl		188	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl		195	3.0	<DL	<DL	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorobiphenyl		200	3.0	2.26	1.74	2.09	1.14
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl		209	5.0	0.98	1.24	1.58	1.06
Total PCBs				38.1	33.6	29.4	21.6
% Lipids				0.61*	0.62	0.62	0.58
Sample weight (g)				25.90	24.48	25.38	25.30
Surrogate Recovery			% rec (65-135)	<b>83.4</b>	<b>87.1</b>	<b>87.2</b>	<b>76.7</b>

\* due to insufficient sample the % lipid value is an

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	DL ug/kg	Back Cove	Back Cove	Back Cove	Back Cove
DEP ID#	Analytes			1	2	3	4
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	0.55	0.47	<DL	0.84	
2,4,5-Trichlorobiphenyl	29	1.0	1.15	1.44	0.88	1.36	
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	2.26	2.69	1.24	1.87	
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL	
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	2.04	1.57	1.06	2.61	
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL	
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL	
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	1.84	1.07	0.75	1.57	
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	2.61	1.14	0.51	0.69	
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	2.33	3.06	1.69	2.84	
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	4.21	3.49	2.25	1.42	
2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL	
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL	
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	0.95	1.55	2.66	3.03	
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL	
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	<DL	1.15	<DL	<DL	
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	2.33	1.47	2.07	1.45	
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	1.75	2.66	1.89	3.37	
Total PCBs			41.7	45.8	38.7	52.9	
% Lipids			0.40	0.55*	0.57	0.70	
Sample weight (g)			24.82	22.52	24.58	24.01	
Surrogate Recovery %		65-135	<b>85.3</b>	<b>75.9</b>	<b>81.2</b>	<b>81.3</b>	

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

**PCBs**

DEP ID#	IUPAC#	DL ug/kg	Boothbay 1	Boothbay 2	Boothbay 3	Boothbay 4
<b>Analytes</b>						
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	1.0	1.05	0.33	<DL	0.68
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	<DL	<DL	<DL	<DL
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	0.63	0.81	<DL	0.46
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	1.25	0.66	0.35	1.33
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	<DL	<DL	<DL	<DL
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	5.87	4.22	2.29	4.59
2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	1.97	2.26	1.05	1.68
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	<DL	<DL	<DL	<DL
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	1.03	1.15	<DL	0.77
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	2.67	<DL	3.01	1.87
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	1.95	3.32	2.18	2.66
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	2.66	1.87	3.39	4.75
Total PCBs			51.6	41.7	38.1	54.7
% Lipids			1.00	1.00	1.02	0.86
Sample weight (g)			24.96	24.35	25.27	25.21
Surrogate Recovery %		65-135	<b>78.6</b>	<b>70.2</b>	<b>74.4</b>	<b>81.9</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs			St. George R Hospital Point			
DEP ID#	IUPAC#	DL ug/kg	1	2	3	4
<b>Analytics</b>						
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	0.43	0.81	1.31	2.74
2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	0.76	1.03	0.55	2.06
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	<DL	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	0.66	0.48	<DL	1.15
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	0.51	1.62	0.86	3.57
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	<DL	<DL	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	2.47	2.03	1.52	5.87
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	1.89	1.55	2.16	1.26
Total PCBs			28.0	27.4	21.9	40.3
% Lipids			0.75	0.62	0.67	0.52
Sample weight (g)			25.33	25.06	25.01	25.04
Surrogate Recovery %		65-135	<b>79.4</b>	<b>78.9</b>	<b>77.6</b>	<b>86.9</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	DL ug/kg	Billings/ Sedge 1	Billings/ Sedge 2	Billings/ Sedge 3	Billings/ Sedge 4
DEP ID#	Analytes						
	2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
	2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
	2,4,4'-Trichlorobiphenyl	28	1.0	<DL	0.51	0.35	<DL
	2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
	2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
	2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
	2,2',5,5'-Tetrachlorobiphenyl	52	1.0	<DL	0.66	<DL	<DL
	2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL
	2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
	2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	<DL	0.45	<DL	<DL
	2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	0.61	1.22	0.87	0.55
	2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	0.45	0.75	0.45	<DL
	2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	0.62	0.35	<DL
	2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL
	2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	<DL	1.38	2.26	0.88
	2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	<DL	2.07	1.84	0.74
	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	1.06	1.66	2.95	1.26
Total PCBs				11.4	27.2	29.4	10.2
% Lipids				0.90	0.71	0.69	0.79
Sample weight (g)				24.23	24.23	25.44	25.36
Surrogate Recovery	%		65-135	<b>82.9</b>	<b>88.2</b>	<b>78.1</b>	<b>83.3</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	DL ug/kg	Rockland	Rockland	Rockland	Rockland
DEP ID#	Analytes			Hbr. 1	Hbr. 2	Hbr. 3	Hbr. 4
	2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
	2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
	2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL	<DL
	2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
	2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
	2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
	2,2',5,5'-Tetrachlorobiphenyl	52	1.0	0.41	0.68	0.74	<DL
	2,3',4,4'-Tetrachlorobiphenyl	66	1.0	0.52	0.41	<DL	<DL
	2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
	2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	0.61	0.75	1.06	0.48
	2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	0.57	1.54	1.69	0.85
	2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	0.61	0.66	1.05	0.47
	2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	1.51	0.77	0.58	0.63
	2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	0.92	0.64	1.18	0.66
	2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL
	2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	1.62	2.30	4.01	1.02
	2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	1.37	<DL	2.31	<DL
	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	1.85	2.36	3.07	1.21
	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	2.89	1.59	1.66	2.37
Total PCBs				42.9	38.7	51.9	30.6
% Lipids				0.37*	0.33	0.39	0.37
Sample weight (g)				25.29	25.17	25.31	24.34
Surrogate Recovery %			65-135	<b>81.9</b>	<b>96.1</b>	<b>86.7</b>	<b>102</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs		IUPAC#	DL ug/kg	Scarborough/P	Scarborough/	Scarborough/	Scarborough/
DEP ID#	Analytes			lmr Is 1	Plmr Is 2	Plmr Is 3	Plmr Is 4
	2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
	2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
	2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL	<DL
	2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
	2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
	2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
	2,2',5,5'-Tetrachlorobiphenyl	52	1.0	0.55	<DL	<DL	<DL
	2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL
	2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
	2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	1.65	0.74	1.34	0.87
	2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	3.09	2.08	2.81	2.36
	2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	1.05	<DL	<DL	<DL
	2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL
	2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL
	2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	1.49	0.69	0.97	1.25
	2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
	2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	0.75	<DL	<DL	<DL
	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	1.95	0.67	0.66	1.14
	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	3.47	1.95	2.81	2.63
Total PCBs				42.1	26.3	35.6	30.2
% Lipids				0.77	0.78	0.78	0.86
Sample weight (g)				25.21	25.25	25.38	25.37
Surrogate Recovery		65-135		<b>91.2</b>	<b>78.2</b>	<b>82.5</b>	<b>85.7</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

**PCBs**

DEP ID# <b>Analytes</b>	IUPAC#	DL ug/kg	Goosefare Brook	Round Pond	Kennebunkport
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	<DL	<DL	<DL
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	0.97	<DL	<DL
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	1.15	<DL	1.58
2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	0.88	<DL	0.98
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	1.25	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	1.05	<DL	1.65
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	<DL	<DL	2.24
Total PCBs			18.4	7.85	20.4
% Lipids			0.53	0.83	0.75
Sample weight (g)			24.98	25.03	24.97
Surrogate Recovery %		65-135	<b>71.5</b>	<b>88.6</b>	<b>86.6</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.1 Total PCB in 1999 Blue Mussel Samples (ww)

PCBs DEP ID# <b>Analytes</b>	IUPAC#	DL ug/kg	Friendship	Friendship	Friendship	Friendship
			1	2	3	4
2,4'-Dichlorobiphenyl	8	1.0	<DL	<DL	<DL	<DL
2,2',5-Trichlorobiphenyl	18	1.0	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	1.0	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	1.0	<DL	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl	44	1.0	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	1.0	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	1.0	<DL	0.48	<DL	<DL
2,3',4,4'-Tetrachlorobiphenyl	66	1.0	<DL	<DL	<DL	<DL
2,2',3,4,5'-Pentachlorobiphenyl	87	2.0	<DL	<DL	<DL	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	2.0	<DL	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	2.0	<DL	0.45	<DL	<DL
2,2',3,4,4',5'-Hexachlorobiphenyl	138	2.0	0.66	1.02	<DL	<DL
2,2',4,4',5,5'-Hexachlorobiphenyl	153	2.0	<DL	<DL	<DL	<DL
2,2',4,4',5,6'-Hexachlorobiphenyl	154	2.0	<DL	<DL	<DL	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	2.0	<DL	<DL	0.65	<DL
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	2.0	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	3.0	1.05	<DL	0.97	<DL
2,2',3,3',4,5',6,6'-Octachlorobiphenyl	200	3.0	<DL	0.83	1.05	<DL
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	5.0	<DL	3.58	<DL	<DL
Total PCBs			14.2	17.3	8.94	10.7
% Lipids			0.89	0.94	0.82	0.61
Sample weight (g)			24.51	25.40	25.20	24.95
Surrogate Recovery %		65-135	<b>77.5</b>	<b>72.7</b>	<b>85.2</b>	<b>82.1</b>

\* due to insufficient sample the % lipid value is an average of the remaining 3 samples.

Table 1.1.2 Concentrations of Mercury in 1999 Blue Mussel Tissue Samples

	Hg mg/kg ww	Hg mg/kg dw	% Solid	% Moisture
Back Cove #1	0.025	0.300	8.2	91.8
Back Cove #1 dup	0.024	0.290	8.2	91.8
Back Cove #2	0.025	0.276	9.0	91.0
Back Cove #3	0.024	0.282	8.7	91.3
Back Cove #4	0.025	0.258	9.7	90.3
Back Cove #4 dup	0.025	0.257	9.7	90.3
Billings #1	0.007	0.065	11.5	88.5
Billings #2	0.009	0.075	11.9	88.1
Billings #3	0.011	0.096	11.4	88.6
Billings #4	0.008	0.067	11.8	88.2
Boothbay #1	0.028	0.195	14.5	85.5
Boothbay #1 dup	0.028	0.195	14.5	85.5
Boothbay #2	0.027	0.202	13.2	86.8
Boothbay #3	0.026	0.192	13.7	86.3
Boothbay #4	0.024	0.178	13.4	86.6
Fore R. #1	0.023	0.246	9.4	90.6
Fore R. #1 dup	0.025	0.265	9.4	90.6
Fore R. #2	0.026	0.249	10.6	89.4
Fore R. #3	0.026	0.252	10.5	89.5
Fore R. #4	0.024	0.231	10.5	89.5
Friendship #1	0.009	0.075	12.0	88.0
Friendship #2	0.010	0.085	11.3	88.7
Friendship #3	0.009	0.073	12.9	87.1
Friendship #4	0.010	0.077	12.7	87.3
Goosefare	0.008	0.085	9.3	90.7
Goosefare dup	0.007	0.074	9.3	90.7
Kennebunkport	0.016	0.126	12.3	87.7
Rockland #1	0.015	0.170	8.7	91.3
Rockland #1 dup	0.010	0.112	8.7	91.3
Rockland #2	0.010	0.119	8.4	91.6
Rockland #3	0.010	0.125	7.9	92.1
Rockland #4	0.010	0.118	8.5	91.5
Round Pd.	0.010	0.073	14.0	86.0
Scarb. #1	0.010	0.082	12.6	87.4
Scarb. #2	0.008	0.066	12.8	87.2
Scarb. #3	0.010	0.079	12.1	87.9
Scarb. #4	0.009	0.072	12.6	87.4
St. George #1	0.014	0.140	10.1	89.9
St. George #2	0.015	0.141	10.3	89.7
St. George #3	0.013	0.128	10.1	89.9
St. George #4	0.015	0.149	9.8	90.2
York/Ned #1	0.013	0.162	8.0	92.0
York/Ned #2	0.012	0.150	7.9	92.1
York/Ned #3	0.013	0.169	8.0	92.0
York/Ned #4	0.012	0.167	7.3	92.7
York/Perk #1	0.009	0.103	8.5	91.5
York/Perk #2	0.010	0.093	11.1	88.9
York/Perk #3	0.012	0.141	8.5	91.5
York/Perk #4	0.010	0.084	12.4	87.6

Table 1.1.3 Heavy Metals in 1999 Blue Mussel Tissue Samples (ww)

Station	Ag ug/g	Al ug/g	Cd ug/g	Cr ug/g	Cu ug/g	Fe ug/g	Ni ug/g	Pb ug/g	Zn ug/g	% Solid
	DL 0.10	DL 0.50	DL 0.03	DL 0.10	DL 0.50	DL 1.25	DL 0.10	DL 0.05	DL 1	
Back Cove #1	<0.10	80.02	0.19	0.32	3.55	100.66	0.81	0.81	7.16	8.2
Back Cove #2	<0.10	63.31	0.18	0.26	2.56	91.28	0.47	0.71	9.19	9.0
Back Cove #3	<0.10	66.84	0.19	0.26	3.63	87.06	1.00	0.78	8.12	8.7
Back Cove #4	<0.10	75.52	0.18	0.26	2.92	90.92	0.44	0.77	8.69	9.7
Billings #1	<0.10	8.18	0.18	<0.10	2.19	13.79	0.51	0.17	8.07	11.5
Billings #2	<0.10	9.75	0.17	<0.10	1.89	15.27	0.18	0.19	6.76	11.9
Billings #3	<0.10	8.97	0.17	<0.10	2.24	15.46	0.35	0.17	6.29	11.4
Billings #4	<0.10	8.69	0.15	<0.10	2.01	14.90	0.12	0.19	6.47	11.8
Boothbay #1	<0.10	19.16	0.18	0.18	3.59	35.70	0.49	1.79	17.13	14.5
Boothbay #2	<0.10	14.74	0.15	0.15	3.53	29.51	0.31	1.63	12.94	13.2
Boothbay #3	<0.10	15.93	0.14	0.14	3.00	29.85	0.20	1.31	12.34	13.7
Boothbay #4	<0.10	14.55	0.13	0.11	3.75	28.64	0.20	1.21	12.15	13.4
Fore R. #1	<0.10	102.15	0.20	0.38	4.75	129.56	2.71*	0.78	14.85	9.4
Fore R. #2	<0.10	98.97	0.19	0.54	4.86	134.37	0.53	0.83	12.95	10.6
Fore R. #3	<0.10	70.32	0.15	0.24	3.07	92.74	0.37	0.64	11.86	10.5
Fore R. #4	<0.10	73.39	0.16	0.22	4.02	97.29	0.48	0.68	11.71	10.5
Friendship #1	<0.10	22.21	0.13	0.11	2.22	27.84	0.76	0.38	8.66	12.0
Friendship #2	<0.10	56.73	0.13	0.15	2.67	78.97	0.36	0.47	8.73	11.3
Friendship #3	<0.10	21.22	0.15	0.12	3.92	29.95	0.44	0.40	9.88	12.9
Friendship #4	<0.10	19.39	0.12	0.11	2.38	28.54	0.36	0.33	9.56	12.7
Goosefare	<0.10	15.84	0.15	0.19	2.59	33.73	0.47	0.15	5.34	9.3
Kennebunkport	<0.10	14.80	0.23	0.12	3.57	27.76	0.31	0.34	8.43	12.3
Rockland #1	<0.10	12.52	0.13	0.15	3.13	25.27	0.52	0.41	7.46	8.7
Rockland #2	<0.10	9.53	0.12	0.14	2.80	21.86	0.88	0.36	6.52	8.4
Rockland #3	<0.10	12.13	0.12	0.11	2.76	27.29	0.13	0.42	7.50	7.9
Rockland #4	<0.10	10.00	0.09	0.10	2.26	18.99	0.48	0.29	6.38	8.5
Round Pd.	<0.10	36.52	0.14	0.13	3.09	47.93	0.77	0.35	12.23	14.0
Scarb. #1	<0.10	18.21	0.21	0.14	2.87	35.45	0.41	<0.05	7.74	12.6
Scarb. #2	<0.10	15.02	0.21	0.14	2.38	35.51	0.19	0.16	7.53	12.8
Scarb. #3	<0.10	16.74	0.20	0.15	2.37	32.61	0.29	0.09	7.66	12.1
Scarb. #4	<0.10	22.68	0.20	0.26	2.61	39.23	0.28	0.16	9.32	12.6
St. George #1	<0.10	54.21	0.16	0.19	3.44	69.97	0.69	0.23	6.93	10.1
St. George #2	<0.10	42.77	0.17	0.16	2.37	61.26	0.73	0.23	7.44	10.3
St. George #3	<0.10	55.22	0.17	0.20	3.65	65.16	0.41	0.26	6.93	10.1
St. George #4	<0.10	53.13	0.17	0.20	3.20	67.02	0.44	0.28	7.04	9.8
York/Ned #1	<0.10	9.31	0.13	0.13	2.20	19.33	0.38	0.17	4.85	8.0
York/Ned #2	<0.10	9.71	0.14	0.12	2.35	21.07	0.35	0.18	5.66	7.9
York/Ned #3	<0.10	9.67	0.14	0.15	2.28	20.88	0.76	0.19	6.67	8.0
York/Ned #4	<0.10	11.68	0.13	0.15	1.94	22.39	0.51	0.19	5.15	7.3
York/Perk #1	<0.10	9.79	0.17	0.14	2.06	19.13	0.48	0.18	4.69	8.5
York/Perk #2	<0.10	25.97	0.14	0.16	2.28	31.97	0.27	0.33	10.45	11.1
York/Perk #3	<0.10	15.46	0.18	0.30	2.33	20.48	0.29	0.10	5.11	8.5
York/Perk #4	<0.10	20.20	0.12	0.13	2.29	26.96	0.19	0.37	8.78	12.4

Table 1.1.4 Heavy Metals in 1999 Blue Mussel Tissue Samples (dw)

Station	Ag ug/g	Al ug/g	Cd ug/g	Cr ug/g	Cu ug/g	Fe ug/g	Ni ug/g	Pb ug/g	Zn ug/g	% Solid
	DL 0.10	DL 0.50	DL 0.03	DL 0.10	DL 0.50	DL 1.25	DL 0.10	DL 0.05	DL 1	
Back Cove #1	<1.22	975.27	2.33	3.87	43.27	1226.77	9.89	9.81	87.32	8.2
Back Cove #2	<1.11	702.44	1.94	2.86	28.40	1012.77	5.23	7.92	101.97	9.0
Back Cove #3	<1.15	770.77	2.22	2.97	41.88	1003.97	11.57	9.03	93.68	8.7
Back Cove #4	<1.04	781.96	1.84	2.71	30.20	941.41	4.60	8.01	89.98	9.7
Billings #1	<0.87	71.11	1.53	<0.87	19.04	119.91	4.44	1.45	70.11	11.5
Billings #2	<0.84	81.91	1.42	<0.84	15.87	128.23	1.50	1.56	56.77	11.9
Billings #3	<0.88	78.75	1.45	<0.88	19.65	135.64	3.05	1.46	55.22	11.4
Billings #4	<0.85	73.86	1.28	<0.85	17.11	126.73	1.05	1.64	54.97	11.8
Boothbay #1	<0.69	131.98	1.22	1.26	24.74	245.92	3.36	12.35	118.01	14.5
Boothbay #2	<0.76	111.59	1.17	1.11	26.76	223.44	2.38	12.32	97.99	13.2
Boothbay #3	<0.73	116.66	1.06	1.00	21.99	218.63	1.49	9.59	90.42	13.7
Boothbay #4	<0.75	108.72	0.98	0.84	28.05	214.04	1.50	9.03	90.77	13.4
Fore R. #1	<1.07	1092.46	2.11	4.06	50.84	1385.66	29.01*	8.39	158.80	9.4
Fore R. #2	<0.94	929.68	1.74	5.05	45.65	1262.17	4.97	7.83	121.64	10.6
Fore R. #3	<0.95	670.92	1.46	2.28	29.30	884.77	3.53	6.14	113.13	10.5
Fore R. #4	<0.95	699.71	1.50	2.05	38.30	927.48	4.62	6.50	111.66	10.5
Friendship #1	<0.84	185.81	1.10	0.88	18.61	232.88	6.33	3.20	72.43	12.0
Friendship #2	<0.89	504.08	1.17	1.37	23.76	701.70	3.18	4.16	77.62	11.3
Friendship #3	<0.77	164.31	1.14	0.93	30.33	231.86	3.41	3.09	76.49	12.9
Friendship #4	<0.79	152.70	0.98	0.87	18.72	224.73	2.85	2.57	75.30	12.7
Goosefare	<1.08	170.54	1.62	2.02	27.85	363.01	5.02	1.64	57.50	9.3
Kennebunkport	<0.81	119.97	1.90	0.94	28.91	224.96	2.50	2.73	68.35	12.3
Rockland #1	<1.15	144.04	1.46	1.71	35.99	290.66	5.93	4.76	85.82	8.7
Rockland #2	<1.20	114.14	1.41	1.62	33.51	261.68	10.52	4.29	78.04	8.4
Rockland #3	<1.27	153.87	1.47	1.39	34.94	346.08	1.70	5.34	95.18	7.9
Rockland #4	<1.18	118.28	1.06	1.23	26.75	224.63	5.67	3.42	75.49	8.5
Round Pd.	<0.71	260.39	0.98	0.91	22.02	341.71	5.50	2.50	87.17	14.0
Scarb. #1	<0.79	144.53	1.68	1.08	22.74	281.35	3.29	<0.40	61.39	12.6
Scarb. #2	<0.78	117.74	1.61	1.11	18.62	278.40	1.50	1.29	59.06	12.8
Scarb. #3	<0.82	137.85	1.67	1.20	19.54	268.56	2.41	0.72	63.10	12.1
Scarb. #4	<0.79	179.78	1.59	2.03	20.72	311.02	2.20	1.24	73.87	12.6
St. George #1	<0.99	536.64	1.57	1.88	34.08	692.57	6.83	2.23	68.60	10.1
St. George #2	<0.97	413.61	1.67	1.55	22.92	592.43	7.05	2.24	71.91	10.3
St. George #3	<0.99	548.23	1.67	2.02	36.27	646.93	4.03	2.57	68.83	10.1
St. George #4	<1.02	540.95	1.76	2.06	32.56	682.34	4.46	2.82	71.66	9.8
York/Ned #1	<1.24	115.85	1.62	1.57	27.40	240.50	4.75	2.14	60.27	8.0
York/Ned #2	<1.26	122.34	1.73	1.54	29.62	265.46	4.42	2.33	71.37	7.9
York/Ned #3	<1.26	121.56	1.78	1.92	28.68	262.47	9.57	2.41	83.87	8.0
York/Ned #4	<1.36	159.12	1.74	1.99	26.39	305.05	6.89	2.61	70.15	7.3
York/Perk #1	<1.17	114.53	1.98	1.61	24.07	223.77	5.64	2.12	54.84	8.5
York/Perk #2	<0.90	233.88	1.23	1.43	20.52	287.94	2.43	2.93	94.13	11.1
York/Perk #3	<1.18	182.00	2.17	3.56	27.40	241.09	3.42	1.22	60.18	8.5
York/Perk #4	<0.81	163.28	1.00	1.06	18.49	217.85	1.56	2.95	70.93	12.4

Table 1.1.5 Heavy Metals in 1999 Clam Tissue Samples (ww)

SITE CODES:

MCBH=Mill Cove Boothbay Harbor  
 HST.R=Hospital Point St. George R  
 FRSP=Fore River South Portland  
 BCP=Back Cove Portland  
 PISR=Plummer Island Scarborough R

	Al mg/kg	Cd mg/kg	Cr mg/kg	Fe mg/kg	Pb mg/kg	Zn mg/kg
	DL mg/kg 1	DL mg/kg 0.05	DL mg/kg 0.20	DL mg/kg 2.5	DL mg/kg 1.00	DL mg/kg 2.00
MCBH	259	0.13	1.72	519	2.89	15.7
MCBH	205	0.16	1.26	652	2.95	16.6
MCBH	208	0.11	1.42	461	2.75	15.9
MCBH	210	0.14	3.26	450	2.84	14.8
MCBH	174	0.12	1.29	368	2.43	17.0
MCBH	189	0.11	1.45	387	2.61	17.4
MCBH	100	0.11	1.47	184	1.55	17.8
MCBH	90	0.10	0.75	166	1.32	14.9
MCBH	58	0.13	0.37	118	1.37	14.8
MCBH	64	0.10	0.66	114	1.13	14.1
MCBH	80	0.10	0.47	167	1.52	15.1
MCBH	77	0.09	0.51	159	1.69	15.3
MCBH	1401	<0.05	28.28	4108	18.07	23.0
MCBH	1288	<0.05	45.08	3643	16.98	24.8
MCBH	1701	<0.05	14.44	3635	19.43	27.2
MCBH	1750	<0.05	24.31	3805	19.94	23.8
MCBH	1285	<0.05	29.43	3442	15.40	20.0
MCBH	1284	<0.05	29.81	3462	15.51	19.9
HST.R	584	0.36	2.97	2949	1.27	11.7
HST.R	576	0.32	2.12	2422	6.45	11.5
HST.R	571	0.32	2.75	2689	1.27	11.3
HST.R	619	0.38	2.22	2885	1.35	12.3
HST.R	545	0.32	3.44	2527	1.11	11.5
HST.R	579	0.37	3.65	2779	1.16	12.3
HST.R	116	0.13	0.82	218	0.25	11.3
HST.R	136	0.14	1.35	295	0.18	10.6
HST.R	126	0.14	1.68	228	0.28	11.2
HST.R	139	0.16	0.86	279	0.30	12.3
HST.R	178	0.14	0.90	367	0.18	12.3
HST.R	184	0.14	0.91	359	0.36	12.0
HST.R	2937	<0.05	13.00	15243	7.42	17.4
HST.R	3237	0.17	12.05	20700	8.99	19.3
HST.R	3713	0.07	13.61	22538	9.52	20.4
HST.R	3203	0.12	12.06	17732	8.28	18.1
HST.R	2863	<0.05	10.35	14527	7.31	15.1
FRSP	323	0.15	2.70	641	1.48	11.9
FRSP	342	0.13	2.77	624	1.48	13.2
FRSP	305	0.13	1.66	575	1.33	12.1
FRSP	298	0.16	1.57	573	1.33	12.4
FRSP	340	0.16	5.33	712	1.54	13.8
FRSP	296	0.14	1.39	670	1.29	12.5
FRSP	85	0.09	1.01	125	0.22	12.5
FRSP	186	0.15	1.60	451	0.97	12.9
FRSP	217	0.14	2.05	498	0.75	13.8
FRSP	141	0.13	2.95	257	0.50	13.0

Table 1.1.5 Heavy Metals in 1999 Clam Tissue Samples (ww)

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

PISR=Plummer Island Scarborough R

	Al mg/kg	Cd mg/kg	Cr mg/kg	Fe mg/kg	Pb mg/kg	Zn mg/kg
	DL mg/kg 1	DL mg/kg 0.05	DL mg/kg 0.20	DL mg/kg 2.5	DL mg/kg 1.00	DL mg/kg 2.00
FRSP	106	0.14	1.27	157	0.49	13.5
FRSP	187	0.11	1.01	280	0.45	13.3
FRSP	2206	<0.05	16.18	6289	12.67	20.0
FRSP	3027	<0.05	17.04	7643	15.46	25.6
FRSP	1015	<0.05	5.28	2775	6.20	9.5
FRSP	1035	<0.05	1.74	2968	5.89	8.6
FRSP	1186	<0.05	2.09	3781	6.67	10.1
FRSP	959	<0.05	6.75	2974	6.49	10.8
BCP	428	0.19	3.06	907	3.06	14.2
BCP	364	0.19	3.68	759	3.70	14.5
BCP	418	0.18	4.62	803	3.00	15.4
BCP	411	0.17	4.99	884	3.24	14.8
BCP	468	0.19	6.04	918	3.74	15.5
BCP	228	0.16	2.22	331	0.96	14.9
BCP	225	0.18	2.08	335	1.28	14.7
BCP	172	0.15	3.10	264	1.04	15.1
BCP	156	0.18	1.30	204	0.91	14.5
BCP	118	0.16	1.13	169	0.67	15.3
BCP	150	0.16	1.46	188	0.60	14.3
BCP	1465	<0.05	16.58	4034	16.28	16.5
BCP	815	0.10	2.26	1906	8.49	9.3
BCP	881	<0.05	2.14	2024	9.58	9.5
BCP	1732	<0.05	26.04	3944	14.57	16.8
BCP	1821	<0.05	21.29	4136	16.27	17.8
BCP	2087	<0.05	39.40	3959	18.43	17.7
PISR	240	0.18	3.45	625	0.56	13.3
PISR	217	0.17	2.75	621	1.05	12.4
PISR	209	0.17	1.92	634	0.63	12.8
PISR	236	0.19	2.47	703	0.80	13.1
PISR	193	0.15	1.54	590	0.71	12.8
PISR	121	0.16	1.17	243	0.36	13.0
PISR	133	0.14	1.14	260	0.33	13.2
PISR	112	0.15	1.01	204	0.28	13.3
PISR	77	0.13	0.70	138	0.21	12.8
PISR	80	0.14	0.48	128	0.16	12.9
PISR	107	0.16	0.72	193	0.06	13.8
PISR	876	0.05	13.79	2969	3.27	6.1
PISR	882	0.08	16.47	2990	3.04	6.6
PISR	940	<0.05	3.27	4630	4.19	9.5
PISR	1098	<0.05	14.28	3712	3.62	8.9
PISR	933	<0.05	2.24	2775	2.68	7.5

Table 1.1.6 Heavy Metals in 1999 Clam Tissue Samples (dw)

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

PISR=Plummer Island Scarborough R

	Al	Cd	Cr	Fe	Pb	Zn
	DL mg/kg 1	DL mg/kg 0.05	DL mg/kg 0.20	DL mg/kg 2.5	DL mg/kg 1.00	DL mg/kg 2.00
MCBH	801	0.40	5.32	1606	8.95	48.6
MCBH	671	0.51	4.14	2138	9.67	54.4
MCBH	656	0.36	4.48	1455	8.68	50.1
MCBH	686	0.45	10.66	1469	9.29	48.5
MCBH	573	0.39	4.24	1211	8.01	55.9
MCBH	623	0.37	4.78	1272	8.60	57.2
MCBH	310	0.34	4.53	567	4.78	55.0
MCBH	296	0.33	2.47	546	4.33	48.9
MCBH	192	0.42	1.23	392	4.55	49.3
MCBH	212	0.33	2.18	375	3.70	46.4
MCBH	251	0.31	1.49	528	4.81	47.5
MCBH	243	0.28	1.62	502	5.34	48.3
MCBH	3882	<DL	78.35	11380	50.06	63.8
MCBH	3125	<DL	109.41	8841	41.22	60.3
MCBH	4901	<DL	41.60	10475	55.99	78.4
MCBH	4888	<DL	67.91	10629	55.69	66.5
MCBH	3511	<DL	80.41	9404	42.08	54.7
MCBH	3508	<DL	81.44	9460	42.38	54.3
HST.R	2347	1.45	11.91	11841	5.09	46.9
HST.R	2009	1.10	7.38	8441	22.48	40.1
HST.R	2032	1.15	9.79	9570	4.53	40.2
HST.R	2310	1.44	8.29	10764	5.03	46.0
HST.R	1976	1.16	12.45	9154	4.01	41.7
HST.R	2097	1.34	13.21	10069	4.19	44.5
HST.R	417	0.46	2.95	782	0.90	40.6
HST.R	401	0.42	3.98	870	0.54	31.4
HST.R	443	0.49	5.90	800	0.97	39.4
HST.R	491	0.58	3.02	984	1.04	43.5
HST.R	620	0.47	3.13	1275	0.61	42.7
HST.R	637	0.50	3.16	1247	1.24	41.6
HST.R	6169	<DL	27.31	32024	15.58	36.5
HST.R	6660	0.35	24.79	42594	18.51	39.7
HST.R	8055	0.15	29.52	48890	20.66	44.2
HST.R	6673	0.25	25.12	36942	17.25	37.7
HST.R	6041	<DL	21.83	30648	15.42	31.9
FRSP	1138	0.53	9.49	2256	5.22	42.0
FRSP	1186	0.45	9.62	2166	5.13	45.7
FRSP	1041	0.45	5.65	1961	4.54	41.2
FRSP	1016	0.53	5.37	1955	4.54	42.3
FRSP	1186	0.57	18.58	2480	5.38	48.3
FRSP	1014	0.49	4.77	2295	4.43	42.8
FRSP	276	0.28	3.27	405	0.72	40.6
FRSP	629	0.50	5.41	1527	3.29	43.8

Table 1.1.6 Heavy Metals in 1999 Clam Tissue Samples (dw)

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

PISR=Plummer Island Scarborough R

	Al	Cd	Cr	Fe	Pb	Zn
	DL mg/kg	DL mg/kg	DL mg/kg	DL mg/kg	DL mg/kg	DL mg/kg
	1	0.05	0.20	2.5	1.00	2.00
FRSP	736	0.46	6.96	1690	2.55	46.9
FRSP	494	0.45	10.36	900	1.74	45.7
FRSP	373	0.48	4.47	552	1.73	47.5
FRSP	618	0.38	3.33	924	1.48	43.9
FRSP	4352	<DL	31.91	12404	24.99	39.4
FRSP	4545	<DL	25.58	11476	23.22	38.4
FRSP	2813	<DL	14.63	7686	17.18	26.4
FRSP	3028	<DL	5.08	8680	17.23	25.2
FRSP	3469	<DL	6.10	11056	19.49	29.5
FRSP	2516	<DL	17.71	7806	17.04	28.4
BCP	1518	0.69	10.84	3216	10.83	50.2
BCP	1287	0.68	13.01	2682	13.06	51.4
BCP	1446	0.62	15.99	2779	10.40	53.4
BCP	1357	0.55	16.47	2917	10.69	48.8
BCP	1518	0.61	19.61	2982	12.14	50.3
BCP	763	0.55	7.44	1108	3.22	49.9
BCP	753	0.60	6.96	1122	4.29	49.1
BCP	564	0.48	10.17	865	3.39	49.5
BCP	529	0.61	4.42	693	3.09	49.3
BCP	416	0.55	4.01	596	2.36	54.1
BCP	498	0.55	4.85	625	1.98	47.5
BCP	4740	<DL	53.64	13054	52.69	53.4
BCP	2605	0.33	7.22	6088	27.12	29.6
BCP	2816	<DL	6.82	6465	30.62	30.3
BCP	5697	<DL	85.67	12973	47.92	55.2
BCP	5115	<DL	59.80	11619	45.71	50.0
BCP	5641	<DL	106.48	10700	49.81	47.8
PISR	805	0.60	11.59	2098	1.88	44.8
PISR	737	0.57	9.37	2111	3.57	42.1
PISR	716	0.58	6.58	2173	2.17	43.9
PISR	765	0.63	8.01	2283	2.60	42.5
PISR	665	0.52	5.30	2035	2.46	44.0
PISR	388	0.51	3.76	782	1.16	41.9
PISR	426	0.46	3.65	836	1.05	42.5
PISR	361	0.47	3.24	655	0.91	42.8
PISR	270	0.47	2.46	488	0.74	45.0
PISR	270	0.46	1.63	433	0.53	43.7
PISR	341	0.51	2.32	616	0.20	44.1
PISR	3010	0.15	47.39	10202	11.23	20.9
PISR	3268	0.28	61.01	11074	11.26	24.3
PISR	3242	<DL	11.28	15967	14.45	32.9
PISR	4158	<DL	54.11	14059	13.72	33.5
PISR	3560	<DL	8.56	10592	10.23	28.6

Table 1.1.7 Concentrations of Mercury in 1999 Clam Tissue samples

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

	Sample ID	Hg ww)	(mg/kg dw)	Percent Solids
MCBH	A1-1	0.062	0.193	32.3
MCBH	A2-1	0.055	0.179	30.5
MCBH	A3-1	0.073	0.230	31.7
MCBH	A4-1	0.060	0.196	30.6
MCBH	A5-1	0.048	0.157	30.4
MCBH	A6-1	0.069	0.214	32.4
MCBH	A7-1	0.058	0.191	30.4
MCBH	A8-1	0.052	0.174	30.1
MCBH	A9-1	0.057	0.188	30.4
MCBH	A10-1	0.056	0.177	31.7
MCBH	A11	0.056	0.154	36.1
MCBH	A12	0.066	0.161	41.2
MCBH	A13	0.074	0.214	34.7
MCBH	A14	0.069	0.193	35.8
MCBH	A15	0.065	0.178	36.6
HST.R	B1	0.032	0.127	24.9
HST.R	B2	0.037	0.127	28.7
HST.R	B3	0.036	0.128	28.1
HST.R	B4	0.034	0.128	26.8
HST.R	B5	0.036	0.130	27.6
HST.R	B6	0.041	0.146	27.9
HST.R	B7	0.041	0.122	33.9
HST.R	B8	0.043	0.150	28.5
HST.R	B9	0.044	0.156	28.4
HST.R	B10	0.047	0.162	28.8
HST.R	B11	0.007	0.014	47.6
HST.R	B12	0.008	0.015	48.6
HST.R	B13	0.007	0.015	46.1
HST.R	B14	0.008	0.017	48.0
HST.R	B15	0.008	0.016	47.4
FRSP	C1	0.044	0.153	28.4
FRSP	C2	0.046	0.159	28.8
FRSP	C3	0.042	0.143	29.3
FRSP	C4	0.046	0.159	28.7
FRSP	C5	0.041	0.141	29.2
FRSP	C6	0.047	0.154	30.9
FRSP	C7	0.052	0.177	29.5
FRSP	C8	0.050	0.174	28.5

Table 1.1.7 Concentrations of Mercury in 1999 Clam Tissue samples

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

PISR=Plummer Island Scarborough R

**Cont:**

	Sample ID	Hg (mg/kg ww)	Hg (mg/kg dw)	Percent Solids
FRSP	C9	0.050	0.176	28.5
FRSP	C10	0.052	0.172	30.3
FRSP	C11	0.011	0.022	50.7
FRSP	C12	0.012	0.018	66.6
FRSP	C13	0.007	0.020	36.1
FRSP	C14	0.008	0.024	34.2
FRSP	C15	0.011	0.029	38.1
BCP	D1	0.061	0.217	28.2
BCP	D2	0.062	0.218	28.3
BCP	D3	0.063	0.216	28.9
BCP	D4	0.074	0.244	30.3
BCP	D5	0.071	0.231	30.8
BCP	D6	0.070	0.232	29.9
BCP	D7	0.071	0.233	30.5
BCP	D8	0.082	0.278	29.5
BCP	D9	0.065	0.230	28.3
BCP	D10	0.067	0.222	30.1
BCP	D11	0.028	0.090	30.9
BCP	D12	0.023	0.075	31.3
BCP	D13	0.029	0.094	30.4
BCP	D14	0.024	0.068	35.6
BCP	D15	0.032	0.087	37.0
PISR	E1	0.025	0.083	29.8
PISR	E2	0.022	0.074	29.4
PISR	E3	0.022	0.075	29.2
PISR	E4	0.023	0.075	30.8
PISR	E5	0.023	0.080	29.0
PISR	E6	0.025	0.082	31.1
PISR	E7	0.025	0.082	31.1
PISR	E8	0.027	0.094	28.4
PISR	E9	0.024	0.083	29.5
PISR	E10	0.027	0.088	31.3
PISR	E11	0.005	0.017	29.1
PISR	E12	0.006	0.021	27.0
PISR	E13	0.006	0.022	29.0
PISR	E14	0.006	0.023	26.4
PISR	E15	0.007	0.028	26.2

Table 1.1.8 Heavy Metals in 1999 Sediment Samples

SITE CODES:

MCBH=Mill Cove Boothbay Harbor

HST.R=Hospital Point St. George R

FRSP=Fore River South Portland

BCP=Back Cove Portland

PISR=Plummer Island Scarborough

All Values are dry weight	AL	CD	DR	FE	PB	ZN	HG ug/g	Moisture %	TOC %
	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g			
<b>SITE</b>									
MCBH #1	8431	0.150	15.3	16257	28.6	64.7	210	28.3	1.15
MCBH #2	7644	0.256	22.5	12713	53.1	87.9	285	40.5	2.28
MCBH #3	7562	0.273	17.6	9877	81.4	126.9	225	29.2	2.67
MCBH #3 dup	n/a	n/a	n/a	n/a	n/a	n/a	213		
MCBH #4	4401	0.317	12.5	6344	60.3	535.3	274	30.5	1.71
MCBH #5	9872	0.231	25.2	13629	55.2	91.1	268	34.9	3.82
BCP #1	22729	0.359	50.7	29474	59.3	111.9	591	61.5	2.92
BCP #1 dup	24182	0.372	50.4	28610	57.8	109.7	n/a		
BCP #2	23068	0.384	51.0	29649	59.5	109.8	555	60.6	2.82
BCP #3	25105	0.350	52.9	30126	59.8	113.1	515	63.0	2.95
BCP #4	25763	0.351	52.9	29625	57.2	110.1	322	59.8	2.93
BCP #5	23421	0.375	51.2	27966	58.2	108.6	528	59.4	2.76
FRSP #1	3093	0.042	5.3	3989	4.8	16.8	21.0	20.6	0.19
FRSP #1 dup	3394	0.043	7.0	4651	4.9	23.1	n/a		
FRSP #2	4064	0.019	5.7	4588	5.8	20.5	29.7	22.9	0.22
FRSP #3	2016	0.067	6.4	3739	5.2	16.7	16.9	21.5	0.24
FRSP #4	5281	0.077	11.7	9522	7.9	39.7	19.9	24.1	0.31
FRSP #5	5501	0.106	8.8	6569	7.2	25.8	31.6	22.2	0.26
FRSP #5 dup	n/a	n/a	n/a	n/a	n/a	n/a	30.5		
PISR #1	3573	0.120	7.5	5082	3.1	20.2	15.2	31.7	0.22
PISR #2	2345	0.120	5.1	3205	2.0	13.0	10.4	28.2	0.46
PISR #3	6796	0.248	13.7	8621	5.1	32.3	20.8	35.3	1.05
PISR #4	4502	0.110	11.3	7030	4.6	26.8	16.9	30.1	0.71
PISR #5	2300	0.121	4.7	3051	1.9	12.3	10.5	26.8	0.23
HST.R #1	36320	0.004	59.7	38590	23.1	84.0	67.8	61.7	2.47
HST.R #2	29909	0.005	54.9	36705	24.3	87.3	78.9	59.1	2.5
HST.R #2 dup	n/a	n/a	n/a	n/a	n/a	n/a	61.5		
HST.R #3	31840	0.027	56.2	38560	23.7	85.9	70.5	57.4	2.52
HST.R #4	36467	0.017	62.7	38128	24.0	86.4	72.0	61.5	2.54
HST.R #5	35671	0.000	58.1	39279	23.4	87.0	62.7	63.1	2.5

## 1.2

### ESTUARINE SEDIMENT CHARACTERIZATION

## **Estuarine Sediment Characterization**

Recent hazardous waste site assessments in lower river systems and estuaries have demonstrated the need for a better understanding of toxic contaminant levels in estuarine sediments. These areas, neither river nor marine, and a transition zone between erosional and depositional areas are not well characterized. Waste discharge license limits are based on ambient concentrations of a toxicant after mixing. Due to stoichiometric changes between fresh and salt water, many contaminants settle shortly after reaching saline conditions. The amount of contaminants deposited in these areas is a reflection of the actual load delivered from the river (and treatment plants) and is largely independent of ambient concentrations. Concern has been raised that although concentrations may be decreasing, loading may be actually increasing due to increased discharge flows.

Some estuarine sediment chemistry has been conducted, but most work has been in euryhaline areas. In the 1999-2003 five year plan, we intend to characterize sediments in the major estuarine areas at a rate of one estuary area each year. The Friends of Merrymeeting Bay helped collect samples from Merrymeeting Bay in 1999. Results are as follows.

### **STATIONS**

AB	Abagadasset River near Bald Head	N43:59.787, W69:51.073.
AR	Androscoggin River near Bayshore Road	N43:57.446 W69:51.591
KR	Kennebec River near Abagadasset Point	N43:59.915 W69:49.826
MR	Muddy River near Pleasant Point	N43:58.205, W69:52.871
SI	Swan's Island south end	N43: 59.787 W69:51.073
WC	Whiskeag Creek mouth	N43:56.169 W69:49.827

Table 1.2.1 Heavy Metals in 1999 Merrymeeting Bay Sediment Samples (dw)

Station	AS	PB	ZN	HG	moisture	TOC
	ug/g	ug/g	ug/g	ug/g	%	%
<b>AB-1</b>	7.89	24.9	108.1	257.4	57.7	3.04
<b>AB-2</b>	8.32	27.0	117.9	328.4	60.5	3.50
<b>AB-3</b>	7.58	27.8	117.3	306.6	62.3	3.43
<b>AR-1</b>	6.84	24.9	123.1	354.7	58.9	4.01
<b>AR-1 dup</b>	n/a	n/a	n/a	362.3		
<b>AR-2</b>	5.64	21.4	112.3	321.5	54.3	2.83/3.13
<b>AR-3</b>	4.98	17.4	94.8	321.5	46.7	2.70
<b>KR-1</b>	9.46	23.4	102.0	231.0	59.7	3.59
<b>KR-1 dup</b>	n/a	n/a	n/a	230.1		
<b>KR-2</b>	8.28	20.7	90.8	211.2	56.1	3.08
<b>KR-3</b>	8.99	21.2	91.5	247.2	57.0	3.03/3.10
<b>MR-1</b>	8.53	32.3	130.8	417.5	69.3	2.96
<b>MR-2</b>	7.57	32.9	127.4	406.1	66.6	6.52
<b>MR-3</b>	8.42	30.4	125.5	363.4	72.1	4.81
<b>MR-3 dup</b>	8.03	30.8	125.6	n/a		
<b>SI-1</b>	7.18	20.3	90.6	196.1	56.1	2.76
<b>SI-1 dup</b>	6.83	19.0	85.1	n/a		
<b>SI-2</b>	8.22	20.8	95.7	195.4	56.1	2.57
<b>SI-3</b>	8.99	22.6	100.7	216.2	61.8	3.51
<b>WC-1</b>	7.34	33.9	129.1	400.7	70.3	5.76
<b>WC-1 dup</b>	7.34	34.2	131.6	n/a		
<b>WC-2</b>	7.66	31.1	133.8	449.8	67.7	4.69
<b>WC-3</b>	7.86	30.3	125.9	451.1	61.0	4.53
<b>Dig. Blank</b>	0.08	0.0	0.4			
<b>Dig. Blank</b>	0.00	0.0	0.3			

Table 1.2.2 Total PCB in 1999 Merrymeeting Bay Sediment Samples (dw)

DEP ID#			MR-1	MR-2	MR-3	WC-1	WC-2	WC-3	KR-1	KR-2	KR-3
WRI ID#			947P	948P	949P	950P	951P	952P	954P	955P	956P
Compound	IUPAC#	DL (ng/g)									
2,4'-Dichlorobiphenyl	8	0.5	<DL								
2,2',5-Trichlorobiphenyl	18	0.5	<DL	<DL	<DL	<DL	<DL	<DL	3.60	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	0.5	<DL	<DL	<DL	<DL	<DL	<DL	6.35	<DL	<DL
2,4,5-Trichlorobiphenyl	29	0.5	<DL								
2,2',3,5'-Tetrachlorobiphenyl	44	0.5	<DL								
2,2',4,6-Tetrachlorobiphenyl	50	0.5	<DL								
2,2',5,5'-Tetrachlorobiphenyl	52	0.5	<DL								
2,3',4,4'-Tetrachlorobiphenyl	66	0.5	<DL	<DL	<DL	<DL	<DL	<DL	0.24	<DL	<DL
2,2',3,4,5'-Pentachlorobiphe	87	0.5	<DL								
2,2',4,5,5'-Pentachlorobiphe	101	0.5	<DL								
2,2',4,6,6'-Pentachlorobiphe	104	0.5	<DL								
2,2',3,3',4,4'-Hexachlorobiphr	128	1.0	<DL								
2,2',3,4,4',5-Hexachlorobiphr	138	1.0	0.78	<DL							
2,2',4,4',5,5'-Hexachlorobiphr	153	1.0	<DL								
2,2',4,4',5,6-Hexachlorobiphr	154	1.0	<DL								
2,2',3,4',5,5',6-Heptachlorob	187	1.0	<DL								
2,2',3,4',5,6,6'-Heptachlorob	188	1.0	<DL								
2,2',3,3',4,4',5,6-Octachlorot	195	1.0	0.60	0.67	0.35	<DL	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorol	200	1.0	<DL	<DL	<DL	0.72	<DL	<DL	<DL	0.68	<DL
2,2',3,3',4,4',5,5',6,6'-Decad	209	2.0	2.24	<DL	1.63	1.33	<DL	1.67	1.47	<DL	1.81
Total PCB concentration (homologue)			8.51	11.3	8.44	6.44	5.91	8.51	36.7	21.3	28.6
Total PCB concentration (Aroclor)			7.66	8.57	10.3	8.55	6.27	6.69	43.8	29.6	32.4
Sample weight (g) dry weight			24.71	25.03	24.91	25.00	24.90	25.10	25.08	24.93	25.41
(sample weights have been adjusted using the % solids to give 25g dry weight)											
% Solids			30.7	33.4	27.9	29.7	32.3	39.0	40.3	43.9	43.0
Surrogate recovery TCMX (% rec.)			74.0	66.4	94.6	81.1	64.2	63.4	108	88.3	70.5
All samples contained multiple target compounds below the lowest standard.											
Any concentrations below the detection limit are estimated values and are for informational purposes only.											

Table 1.2.2 Total PCB in 1999 Merrymeeting Bay Sediment Samples (dw)

DEP ID#			AR-1	AR-2	AR-3	AB-1	AB-2	AB-3	SI-1	SI-2	SI-3
WRI ID#			957P	958P	959P	961P	962P	963P	964P	965P	966P
Compound	IUPAC#	DL (ng/g)									
2,4'-Dichlorobiphenyl	8	0.5	<DL	<DL							
2,2',5-Trichlorobiphenyl	18	0.5	<DL	<DL							
2,4,4'-Trichlorobiphenyl	28	0.5	<DL	<DL							
2,4,5-Trichlorobiphenyl	29	0.5	<DL	<DL							
2,2',3,5'-Tetrachlorobiphenyl	44	0.5	<DL	<DL							
2,2',4,6-Tetrachlorobiphenyl	50	0.5	<DL	<DL							
2,2',5,5'-Tetrachlorobiphenyl	52	0.5	<DL	<DL							
2,3',4,4'-Tetrachlorobiphenyl	66	0.5	<DL	<DL							
2,2',3,4,5'-Pentachlorobiphe	87	0.5	<DL	<DL							
2,2',4,5,5'-Pentachlorobiphe	101	0.5	<DL	<DL							
2,2',4,6,6'-Pentachlorobiphe	104	0.5	<DL	<DL							
2,2',3,3',4,4'-Hexachlorobiphr	128	1.0	<DL	<DL							
2,2',3,4,4',5-Hexachlorobiphr	138	1.0	1.56	2.98	1.04	1.55	<DL	<DL	<DL	<DL	<DL
2,2',4,4',5,5'-Hexachlorobiphr	153	1.0	<DL	<DL							
2,2',4,4',5,6-Hexachlorobiphr	154	1.0	<DL	<DL							
2,2',3,4',5,5',6-Heptachlorob	187	1.0	<DL	<DL							
2,2',3,4',5,6,6'-Heptachlorob	188	1.0	<DL	<DL							
2,2',3,3',4,4',5,6-Octachlorot	195	1.0	2.26	1.14	0.84	<DL	<DL	<DL	3.67	<DL	<DL
2,2',3,3',4,5',6,6'-Octachlorol	200	1.0	1.75	0.79	1.05	0.60	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,5',6,6'-Decad	209	2.0	2.25	0.91	1.88	1.66	<DL	1.69	<DL	<DL	<DL
Total PCB concentration (homologue)		25.6	32.7	42.7	18.3	25.7	14.3	14.1	724	4.81	
Total PCB concentration (Aroclor)		21.9	35.6	49.8	17.6	18.7	16.3	11.5	525	7.36	
Sample weight (g) dry weight		25.09	24.97	25.19	24.69	24.83	24.82	25.11	24.66	25.02	
(sample weights have been adjusted using the % solids to give 25g dry weight)											
% Solids		41.1	45.7	53.3	42.3	39.5	37.8	43.9	43.9	38.2	
Surrogate recovery TCMX (% rec.)		90.1	89.6	65.2	94.7	66.1	73.4	72.5	84.2	71.6	
All samples contained multiple target compounds below the lowest standard.											
Any concentrations below the detection limit are estimated values and are for informational purposes only.											

Table 1.2.3 Pesticides in 1999 Merrymeeting Bay Sediment Samples (dw)

<b>DEP ID#</b>	<b>DL</b>	<b>MR-1</b>	<b>MR-2</b>	<b>MR-3</b>	<b>WC-1</b>	<b>WC-2</b>	<b>WC-3</b>	<b>KR-1</b>	<b>KR-2</b>	<b>KR-3</b>
<b>Compound</b>	<b>ng/l</b>									
Hexachlorobenzene	0.5	<DL								
Lindane	0.5	<DL								
Heptachlor	0.5	<DL								
Aldrin	0.5	<DL								
Heptachlor Epoxide	0.5	<DL								
2,4-DDE	1.0	<DL								
Endosulfan I	1.0	<DL								
a-Chlordane	1.0	<DL								
Nonachlor	1.0	<DL								
4,4-DDE	1.0	<DL	0.51	<DL						
Dieldrin	0.5	<DL								
2,4-DDD	1.0	<DL	0.60	<DL						
Endosulfan II	1.0	<DL								
4,4-DDD	1.0	<DL								
2,4-DDT	1.0	<DL	<DL	<DL	<DL	0.32	1.64	<DL	<DL	<DL
4,4-DDT	1.0	<DL	0.66	<DL	<DL	<DL	<DL	0.27	<DL	0.75
Mirex	1.0	<DL								
<b>Sample weight (g) dry w</b>	24.71	25.03	24.91	25.00	24.90	25.10	25.08	24.93	25.41	
<b>% Solids</b>		30.69	33.4	27.91	29.66	32.33	39.02	40.29	43.94	43.02

Table 1.2.3 Pesticides in 1999 Merrymeeting Bay Sediment Samples (dw)

<b>DEP ID#</b>	<b>DL</b>	<b>AR-1</b>	<b>AR-2</b>	<b>AR-3</b>	<b>AB-1</b>	<b>AB-2</b>	<b>AB-3</b>	<b>SI-1</b>	<b>SI-2</b>	<b>SI-3</b>
<b>Compound</b>	<b>ng/l</b>									
Hexachlorobenzene	0.5	<DL								
Lindane	0.5	<DL								
Heptachlor	0.5	<DL								
Aldrin	0.5	<DL								
Heptachlor Epoxide	0.5	<DL								
2,4-DDE	1.0	<DL								
Endosulfan I	1.0	<DL								
α-Chlordane	1.0	<DL								
Nonachlor	1.0	<DL								
4,4-DDE	1.0	<DL	<DL	<DL	0.40	<DL	<DL	<DL	<DL	<DL
Dieldrin	0.5	<DL								
2,4-DDD	1.0	<DL	<DL	<DL	0.18	<DL	<DL	<DL		
Endosulfan II	1.0	<DL								
4,4-DDD	1.0	<DL								
2,4-DDT	1.0	<DL	0.92	<DL	1.13	<DL	1.08	<DL	1.15	1.68
4,4-DDT	1.0	<DL	<DL	<DL	<DL	<DL	0.28	<DL		
Mirex	1.0	<DL								
<b>Sample weight (g) dry</b>		25.09	24.97	25.19	24.69	24.83	24.82	25.11	24.66	25.02
<b>% Solids</b>		41.09	45.71	53.33	42.32	39.53	37.75	43.86	43.86	38.17

1.3

## MARINE SPORTFISH HEALTH ADVISORY

## 1.3

### MARINE SPORTFISH HEALTH ADVISORY

In 1995 bluefish and striped bass were found to contain levels of PCBs and Hg that warranted consumption advisories. There were limited numbers of samples of each species and the fish were from only the Kennebec estuary. Furthermore, new regulations on striped bass have reduced the legal size of bass to between 20 and 26 inches and the availability of the smaller fish may change the level of human exposure. Because of all of these new factors, additional information is needed to be used in a new risk analysis and also look at other areas of the coast. Sampling in 1997 and 1998 did not collect the desired number of fish and needs to be completed in 1999. We attempted to collect 20 striped bass of two sizes, within the slot limit, 20-26 ", and greater than 40", at each of 3 stations, Androscoggin, Kennebec, and a coastal site. We also attempted to collect twenty bluefish of 2 size classes, snappers and adults, from the Kennebec estuary or Casco Bay. We were successful in collecting only 20 striped bass from the Kennebec River at Augusta. The fish were analyzed individually for mercury and as four composites of five fish each for PCBs.

Table 1.3.1 Mercury Concentrations in 1999 Striped Bass Samples

Sample ID	HG mg/kg
KAG-STB-1	0.360
KAG-STB-2	0.460
KAG-STB-3	0.333
KAG-STB-4	0.376
KAG-STB-5	0.354
KAG-STB-6	0.191
KAG-STB-7	0.304
KAG-STB-8	0.363
KAG-STB-9	0.379
KAG-STB-10	0.265
KAG-STB-11	0.236
KAG-STB-12	0.178
KAG-STB-13	0.450
KAG-STB-14	0.783
KAG-STB-15	0.096
KAG-STB-16	0.279
KAG-STB-17	0.254
KAG-STB-18	0.239
KAG-STB-19	0.129
KAG-STB-20	0.292
<b>mean</b>	<b>0.316</b>

Table 1.3.2 PCB Concentrations in 1999 Striped Bass Samples

DEP ID#			KAG-STB-1	KAG-STB-2	KAG-STB-3	KAG-STB-4	KAG-STB-5
WRI ID #			99-40	99-41	99-42	99-43	99-44
	IUPAC	DL	704	705	706	707	708
Compound	#	ng/g					
2,4'-Dichlorobiphenyl	8	0.5	0.25	1.64	0.26	0.70	0.46
2,2',5-Trichlorobiphenyl	18	0.5	<DL	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	0.5	<DL	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	0.5	0.15	1.13	1.44	0.22	0.27
2,2',3,5'-Tetrachlorobiphenyl	44	0.5	<DL	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	0.5	<DL	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	0.5	0.47	0.55	0.65	0.41	0.62
2,3',4,4'-Tetrachlorobiphenyl	66	0.5	0.58	<DL	<DL	0.95	<DL
2,2',3,4,5'-Pentachlorobiphenyl	87	0.5	0.31	<DL	0.69	<DL	0.51
2,2',4,5,5'-Pentachlorobiphenyl	101	0.5	0.52	0.41	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	0.5	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphenyl	128	1.0	0.75	1.01	0.84	1.23	0.51
2,2',3,4,4',5'-Hexachlorobiphenyl	138	1.0	1.61	1.05	1.23	1.08	0.98
2,2',4,4',5,5'-Hexachlorobiphenyl	153	1.0	5.21	2.15	2.52	0.40	1.48
2,2',4,4',5,6-Hexachlorobiphenyl	154	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,4',5,5',6-Heptachlorobiphenyl	187	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,4',5,6,6'-Heptachlorobiphenyl	188	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobiphenyl	195	1.0	<DL	<DL	1.44	2.87	0.86
2,2',3,3',4,5,6,6'-Octachlorobiphenyl	200	1.0	<DL	<DL	<DL	2.06	<DL
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	209	2.0	<DL	<DL	<DL	<DL	<DL
<b>Total PCB concentration</b>			10.3	12.6	15.3	16.9	9.65
<b>Surrogate recovery TCMIX (% rec.)</b>			86.3	95.2	93.6	91.4	85.9
<b>Sample weight (g)</b>			25.72	25.61	24.58	25.33	25.25

Table 1.3.2 PCB Concentrations in 1999 Striped Bass Samples

DEP ID#			KAG-STB-6	KAG-STB-7	KAG-STB-8	KAG-STB-9	KAG-STB-10
WRI ID#			99-45	99-46	99-47	99-48	99-49
	IUPAC	DL	709	711	712	713	714
Compound	#	ng/g					
2,4'-Dichlorobiphenyl	8	0.5	0.93	2.72	1.84	1.41	0.53
2,2',5-Trichlorobiphenyl	18	0.5	<DL	<DL	<DL	<DL	<DL
2,4,4'-Trichlorobiphenyl	28	0.5	<DL	<DL	<DL	<DL	<DL
2,4,5-Trichlorobiphenyl	29	0.5	2.09	<DL	<DL	<DL	<DL
2,2',3,5'-Tetrachlorobiphenyl	44	0.5	<DL	<DL	<DL	<DL	<DL
2,2',4,6-Tetrachlorobiphenyl	50	0.5	<DL	<DL	<DL	<DL	<DL
2,2',5,5'-Tetrachlorobiphenyl	52	0.5	0.70	0.56	<DL	0.56	0.60
2,3',4,4'-Tetrachlorobiphenyl	66	0.5	<DL	0.61	<DL	0.46	<DL
2,2',3,4,5-Pentachlorobiphenyl	87	0.5	0.50	0.52	0.56	0.48	<DL
2,2',4,5,5'-Pentachlorobiphenyl	101	0.5	<DL	<DL	<DL	<DL	<DL
2,2',4,6,6'-Pentachlorobiphenyl	104	0.5	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4'-Hexachlorobiphe	128	1.0	0.69	1.04	<DL	0.88	<DL
2,2',3,4,4',5'-Hexachlorobiphe	138	1.0	1.15	1.31	0.74	0.82	0.66
2,2',4,4',5,5'-Hexachlorobiphe	153	1.0	0.93	1.16	1.20	2.28	1.06
2,2',4,4',5,6'-Hexachlorobiphe	154	1.0	<DL	<DL	0.48	0.48	<DL
2,2',3,4',5,5,6-Heptachlorobi	187	1.0	<DL	<DL	0.87	0.88	<DL
2,2',3,4',5,6,6-Heptachlorobi	188	1.0	<DL	<DL	<DL	<DL	<DL
2,2',3,3',4,4',5,6-Octachlorobi	195	1.0	<DL	2.24	<DL	3.08	<DL
2,2',3,3',4,5,6,6-Octachlorobi	200	1.0	<DL	0.95	<DL	1.55	<DL
2,2',3,3',4,4',5,5',6,6-Decachl	209	2.0	<DL	<DL	<DL	<DL	<DL
Total PCB concentration			13.0	18.3	9.25	16.1	6.33
Surrogate recovery TCMX (% rec.)			88.2	102	95.6	98.7	106
Sample weight (g)			25.79	25.11	25.20	25.08	24.83

Table 1.3.2 PCB Concentrations in 1999 Striped Bass Samples

DEP ID#			KAGSTB-11	KAGSTB-12	KAGSTB-13	KAGSTB-14	KAGSTB-15
WRID#			9950	9951	9952	9953	9954
	IUPAC	DL	715	716	718	719	720
Compound	#	ng/g					
2,4-Dichlorobiphenyl	8	0.5	0.93	4.07	DL	DL	DL
2,2,5-Trichlorobiphenyl	18	0.5	DL	DL	DL	0.32	DL
2,4,4'-Trichlorobiphenyl	28	0.5	DL	DL	DL	DL	DL
2,4,5-Trichlorobiphenyl	29	0.5	0.29	0.80	DL	7.70	286
2,2,3,5-Tetrachlorobiphenyl	44	0.5	DL	DL	DL	DL	DL
2,2,4,6-Tetrachlorobiphenyl	50	0.5	DL	DL	DL	DL	DL
2,2,5,5-Tetrachlorobiphenyl	52	0.5	DL	0.88	DL	0.60	0.65
2,3,4,4'-Tetrachlorobiphenyl	66	0.5	DL	DL	DL	DL	DL
2,2,3,4,5-Pentachlorobiphenyl	87	0.5	DL	0.56	0.47	0.48	0.49
2,2,4,5,5-Pentachlorobiphenyl	101	0.5	DL	DL	DL	DL	DL
2,2,4,6,6-Pentachlorobiphenyl	104	0.5	DL	DL	DL	DL	DL
2,2,3,3,4,4-Hexachlorobiphenyl	128	1.0	0.55	DL	DL	DL	DL
2,2,3,4,4',5-Hexachlorobiphenyl	138	1.0	DL	DL	DL	DL	DL
2,2,4,4,5,5-Hexachlorobiphenyl	153	1.0	0.87	1.61	0.70	247	0.72
2,2,4,4,5,6-Hexachlorobiphenyl	154	1.0	DL	DL	DL	DL	DL
2,2,3,4,5,5,6-Heptachlorobiphenyl	187	1.0	DL	0.84	DL	DL	0.85
2,2,3,4,5,6,6-Heptachlorobiphenyl	188	1.0	DL	DL	DL	DL	DL
2,2,3,3,4,4,5,6-Octachlorobiphenyl	195	1.0	DL	DL	DL	DL	1.06
2,2,3,3,4,5,6,6-Octachlorobiphenyl	200	1.0	DL	DL	DL	DL	DL
2,2,3,3,4,4,5,5,6,6-Decachlorobiphenyl	209	2.0	DL	DL	DL	DL	DL
Total PCB concentration			5.97	132	4.78	15.7	9.47
Surrogate recovery TCMX (% rec.)			89.6	84.3	88.6	92.0	96.7
Sample weight (g)			25.24	24.87	25.38	25.05	24.68

Table 1.3.2 PCB Concentrations in 1999 Striped Bass Samples

DEP#			KAG-STB-16	KAG-STB-17	KAG-STB-18	KAG-STB-19	KAG-STB-20	
WRID#			99-55	99-56	99-57	99-58	99-59	
Compound	IUPAC #	ng/g	DL	721	722	723	725	726
2,4-Dichlorobiphenyl	8	0.5	DL	DL	0.76	1.25	1.64	
2,2,5-Trichlorobiphenyl	18	0.5	DL	DL	DL	DL	DL	
2,4,4'-Trichlorobiphenyl	28	0.5	DL	DL	DL	DL	DL	
2,4,5-Trichlorobiphenyl	29	0.5	0.29	DL	DL	DL	DL	
2,2,3,5-Tetrachlorobiphenyl	44	0.5	DL	DL	DL	DL	DL	
2,2,4,6-Tetrachlorobiphenyl	50	0.5	DL	DL	DL	DL	DL	
2,2,5,5-Tetrachlorobiphenyl	52	0.5	0.52	0.44	0.61	DL	DL	
2,3,4,4'-Tetrachlorobiphenyl	66	0.5	DL	DL	DL	DL	DL	
2,2,3,4,5-Pentachlorobiphenyl	87	0.5	DL	DL	DL	0.48	0.45	
2,2,4,5,5-Pentachlorobiphenyl	101	0.5	DL	DL	DL	DL	DL	
2,2,4,6,6-Pentachlorobiphenyl	104	0.5	DL	DL	DL	DL	DL	
2,2,3,3,4,4'-Hexachlorobiphe	128	1.0	DL	DL	DL	DL	DL	
2,2,3,4,4,5-Hexachlorobiphe	138	1.0	DL	DL	DL	DL	DL	
2,2,4,4,5,5-Hexachlorobiphe	153	1.0	0.61	0.87	0.66	0.57	DL	
2,2,4,4,5,6-Hexachlorobiphe	154	1.0	0.51	DL	DL	DL	DL	
2,2,3,4,5,5,6-Heptachlorobi	187	1.0	0.86	DL	DL	DL	DL	
2,2,3,4,5,6,6-Heptachlorobi	188	1.0	DL	DL	DL	DL	DL	
2,2,3,3,4,4,5,6-Octachlorobi	195	1.0	DL	1.47	2.66	0.74	1.51	
2,2,3,3,4,5,6,6-Octachlorobi	200	1.0	DL	DL	1.81	DL	0.68	
2,2,3,3,4,4,5,5,6,6-Decachi	209	20	DL	DL	DL	DL	DL	
Total PCB concentration			7.74	4.69	10.3	5.51	8.65	
Surrogate recovery TCMX (% rec)			108	954	91.7	888	83.6	
Sample weight(g)			25.67	25.06	24.90	24.80	24.40	

1.4

## MERCURY IN HARBOR SEAL PUPS

## MERCURY IN HARBOR SEAL PUPS

Mercury has been well documented as a threat to wildlife in Maine. One of the objectives of SWAT is to assess the extent and severity of contamination. Past work has looked at various trophic levels (filter feeding mussels, benthic feeding lobsters, and piscivorous cormorants) to determine whether locally elevated concentrations of contaminants such as mercury contribute to a broader geographic and/or trophic scale elevation.

This past year, we learned of a small study of mercury in hair of stranded harbor seal pups, conducted by David Harris of the University of Southern Maine. Initial results indicate a pattern that reflects findings described thus far by SWAT and other studies.

This study began in the summer of 1998 and will continue for a period of five years. We measure the mercury levels in the hair of harbor seal pups that strand on the Maine coast. The data we collect will: 1) identify areas with elevated mercury levels in the Maine coastal environment, 2) provide a picture of how mercury contamination in the Gulf of Maine food chain is changing with time, 3) determine the level of mercury contamination to which harbor seals are exposed during the most sensitive time period in their development and 4) provide a baseline to which future measurements can be compared.

**Preliminary Results:** These are the preliminary findings for the first two years of this five-year project.

Year	1998	1999
n	21	27
Mean (mg/kg)	2.78	1.54
95% C.I.	0.62	0.28
Minimum (mg/kg)	0.94	0.41
Maximum (mg/kg)	5.77	3.56
% 0 - 2 mg/kg	38	85
% 2 - 4 mg/kg	43	15
% 4 - 6 mg/kg	19	0

**Conclusions:** There is no obvious temporal trend in these preliminary results. It is notable that 19% of the measurements in 1998 exceeded 4 mg/kg but none of the measurements from 1999 fell into this range.

**Raw Data:** These are the raw data values for the above analysis.

<b>Year</b>	<b>1998</b>	<b>1999</b>
<b>Hg (mg/kg)</b>	0.94	1.26
	4	0.95
	5.11	1.15
	1.99	1.4
	1.14	1.83
	3.27	1.24
	1.79	1.82
	2.6	0.68
	1.22	1.98
	2.31	0.86
	5.77	1.66
	2.7	1.93
	1.9	1.14
	1.53	1.41
	3.69	0.41
	1.79	2.58
	5.15	0.87
	2.09	1.34
	2.97	1.74
	3.74	0.77
	2.69	2.4
		1.52
		1.72
		0.88
		3.56
		2.92
		1.68